Human Health Risk Assessment & Wildlife Risk Assessment

Azimuth Consulting Group Partnership
Michel Coal Project Environmental Assessment Working Group
Valued Components and Assessment Boundaries
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St. Eugene's Mission, Cranbrook, B.C.

AZIMUTH

Outline

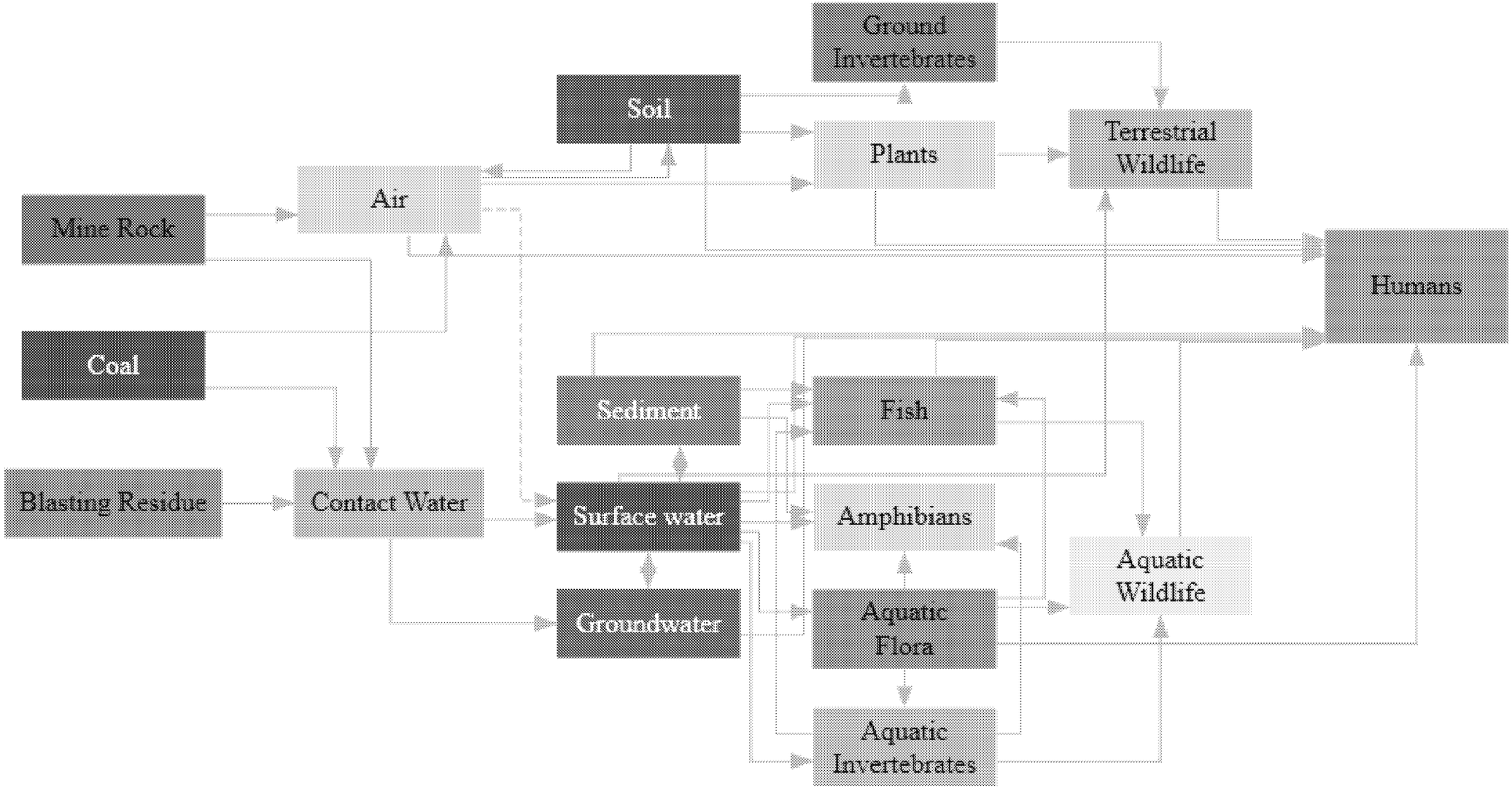
1. Assessment Boundaries
2. Health VCs and the Human Health Risk Assessment
3. Wildlife VCs and the Wildlife Risk Assessment

Assessment Boundaries

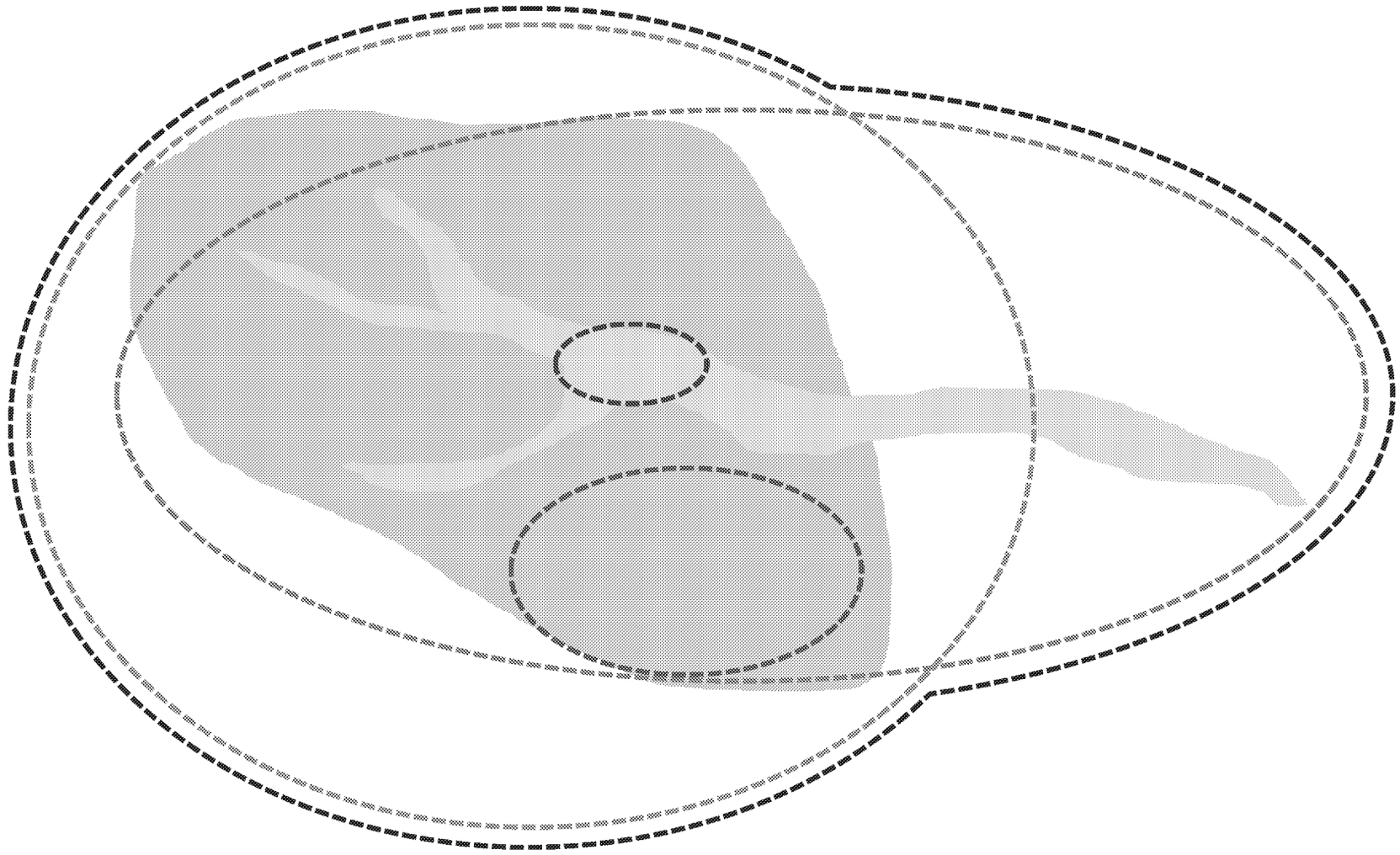
- What is the Spatial Scope of the Human Health Risk Assessment & Wildlife Risk Assessment?

Risk Assessment Spatial Boundaries Depend On

1. Spatial scale of potential changes to contaminant concentrations in exposure media (air, soil, water, sediment, biota)
2. The location of people (HHRA) or wildlife (WRA) that may come into contact or consume affected exposure media
   a) Humans – unlimited; affected country foods may be consumed anywhere.
   b) Wildlife – the combined extent of the home ranges of organisms that may come into contact with or consume affected exposure media; for migratory species, may extend long distances beyond the boundaries of change to contaminant concentrations in air, soil, plants, water or sediment.


Ground Invertebrates
Soil
Plants
Terrestrial Wildlife
Air
Mine Rock
Humans
Coal
Sediment
Fish
Blasting Residue
Contact Water
Surface water
Amphibians
Aquatic Wildlife
Groundwater
Aquatic Flora
Aquatic Invertebrates

Risk Assessment Spatial Domains



Change in air, soil, & plant chemistry

Change in water & sediment chemistry

Small home range aquatic receptor

Large home range aquatic receptor

Small home range terrestrial receptor

Large home range terrestrial receptor

Spatial scope of wildlife risk assessment

Health VCs and Human Health Risk Assessment

HHRA – Receptors of Concern

Variation in Human Exposure

More exposed	Less exposed
Lifetime resident or frequent visitor	Occasional visitor
People who engage in outdoor recreational activities	People who do not engage in outdoor recreational activities
People who consume a lot of country foods	People who do not consume country foods

Wildlife VCs and Wildlife Risk Assessment

Wildlife ROCs and VCs

Ecological Niche of ROCs in WRA	Primary Diet Type for Ecological Niche	Current ROCs (VCs bold) for the MCP
Terrestrial-Feeding Mammals		
Small Herbivore	Plant-based diet	**Columbia ground squirrel**
Large Herbivore	Plant-based diet	**Rocky Mountain elk, Rocky Mountain bighorn sheep***
Small Invertivore - aerial feeders	Flying Invertebrates	**Little brown myotis***
Small Invertivore - ground-based feeders	Ground Invertebrates	Shrew
Large Omnivore	Plants, insects, carrion	**Grizzly bear**
Small Omnivore	Plant-based/insects/invertebrates	Vole
Carnivore	Animal-based diet	**American badger*, American marten, Canada lynx, Wolverine**
Terrestrial-Feeding Birds		
Small Herbivore	Plant-based diet	Dark-eyed junko
Medium Herbivore	Plant-based diet	Ruffed grouse
Invertivore - aerial feeders	Flying invertebrates	**Olive-sided flycatcher*, Common nighthawk***
Invertivore - ground-based diet	Ground Invertebrates	American robin
Omnivore	Plant-based/invertebrates/small mammals	Song sparrow
Carnivore	Animal-based diet	**Golden eagle**
Aquatic-Feeding Mammals		
Herbivore	Aquatic Plants	**Moose**
Piscivore	Fish	**River otter**
Aquatic-Feeding Birds		
Invertivore	Aquatic Invertebrates	**American dipper**
Piscivore	Fish	Belted kingfisher

Notes:

* Wildlife species listed federally or provincially due to conservation concerns.

VCs for the MCP are bold and underlined

PF - Linking Sources to Receptors

CONTAMINANT SOURCE

Soil

Receiving water

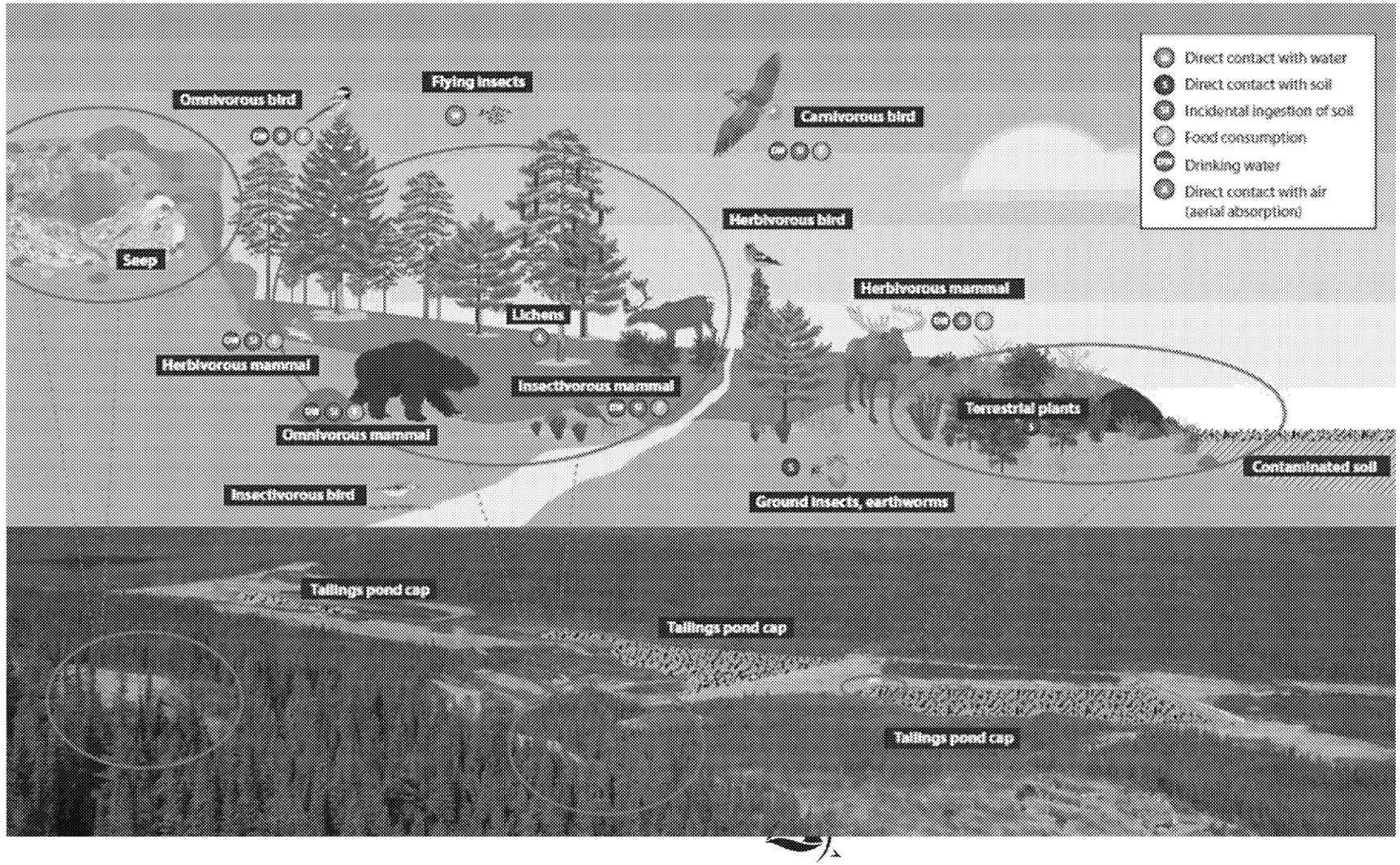
Contaminant Intake

RECEPTOR

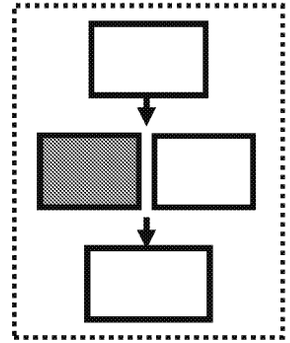
Groundwater

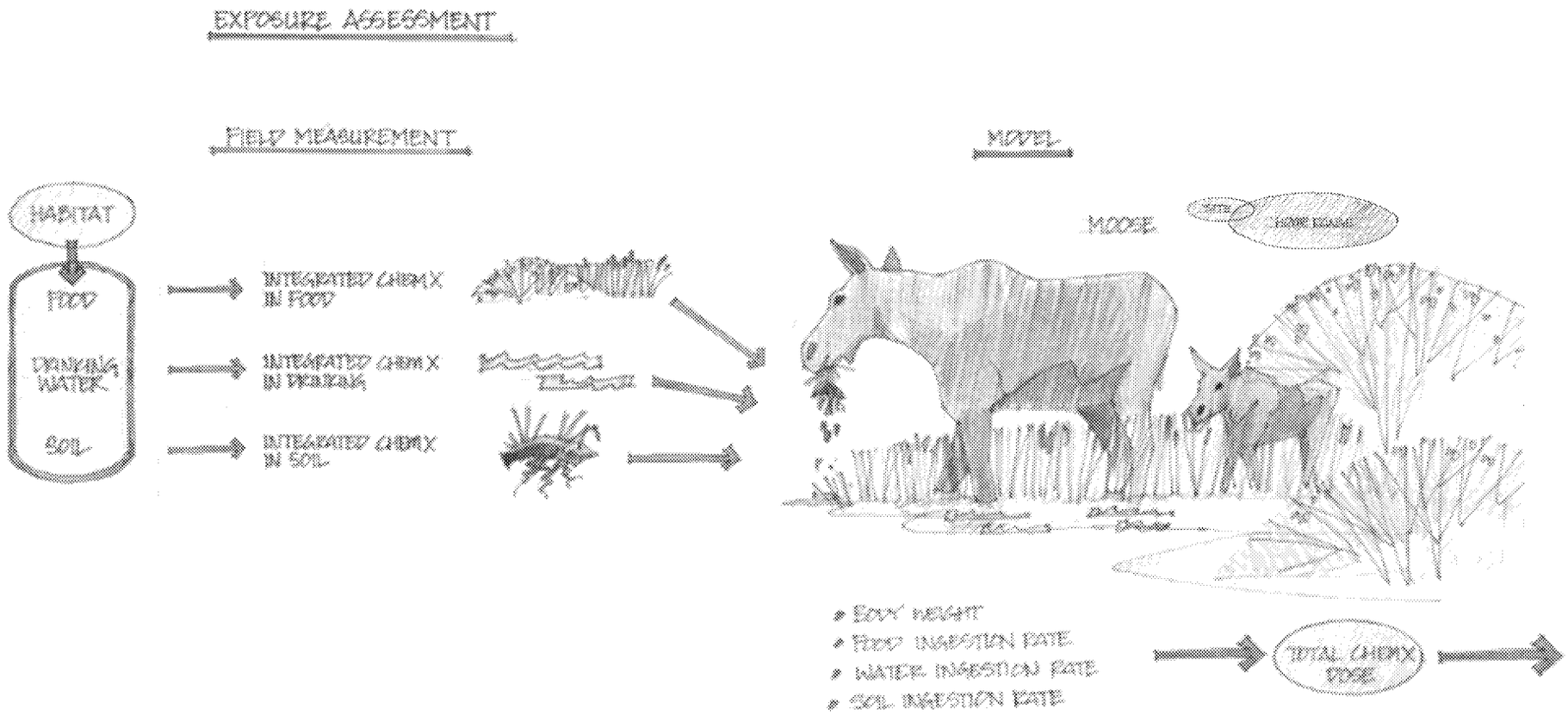
RECEPTOR

PF - Conceptual Model

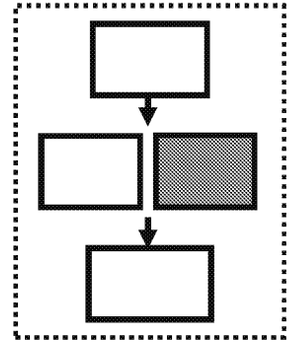


LOE Part 1: Exposure





LOE Part 2: Effects Assessment

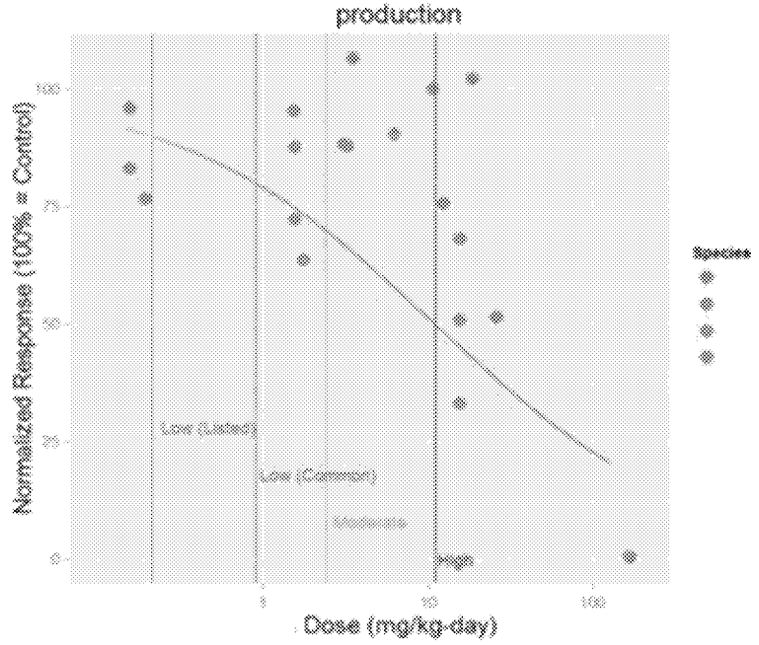


Point estimate of "safe" exposure

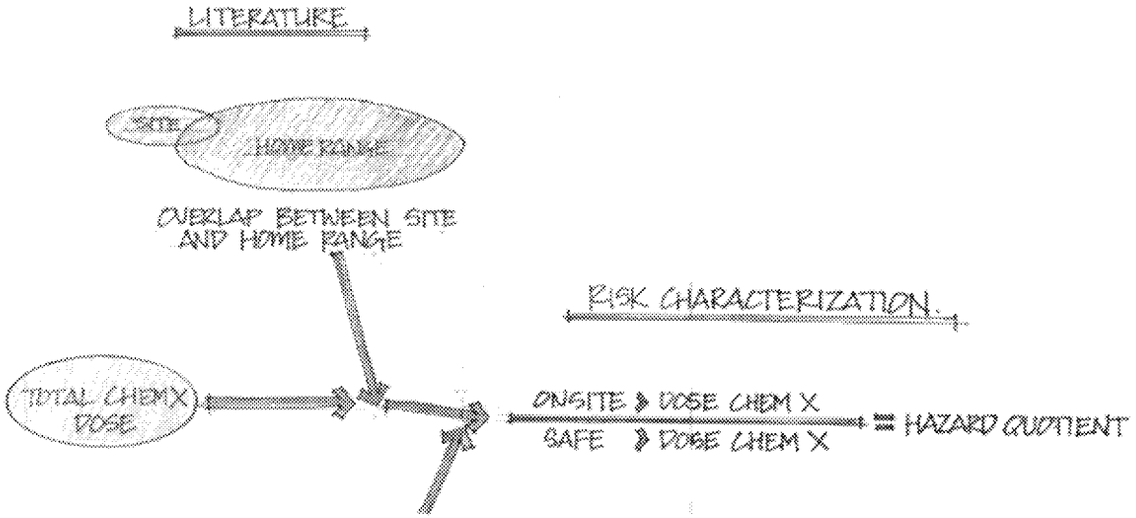
- Toxicity reference values (TRV) based on no effects (NOAEL) or low effects (LOAEL) for ERA
- Prescribed values for HHRA
- Fairly easy to derive/obtain from literature, but limited in value

Dose-response relationship

- Literature studies
- Typically ERA only



LOE Part 3a: Dose Response



HQ

TR

V

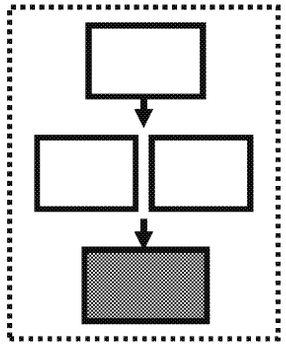
<u>HHRA</u>

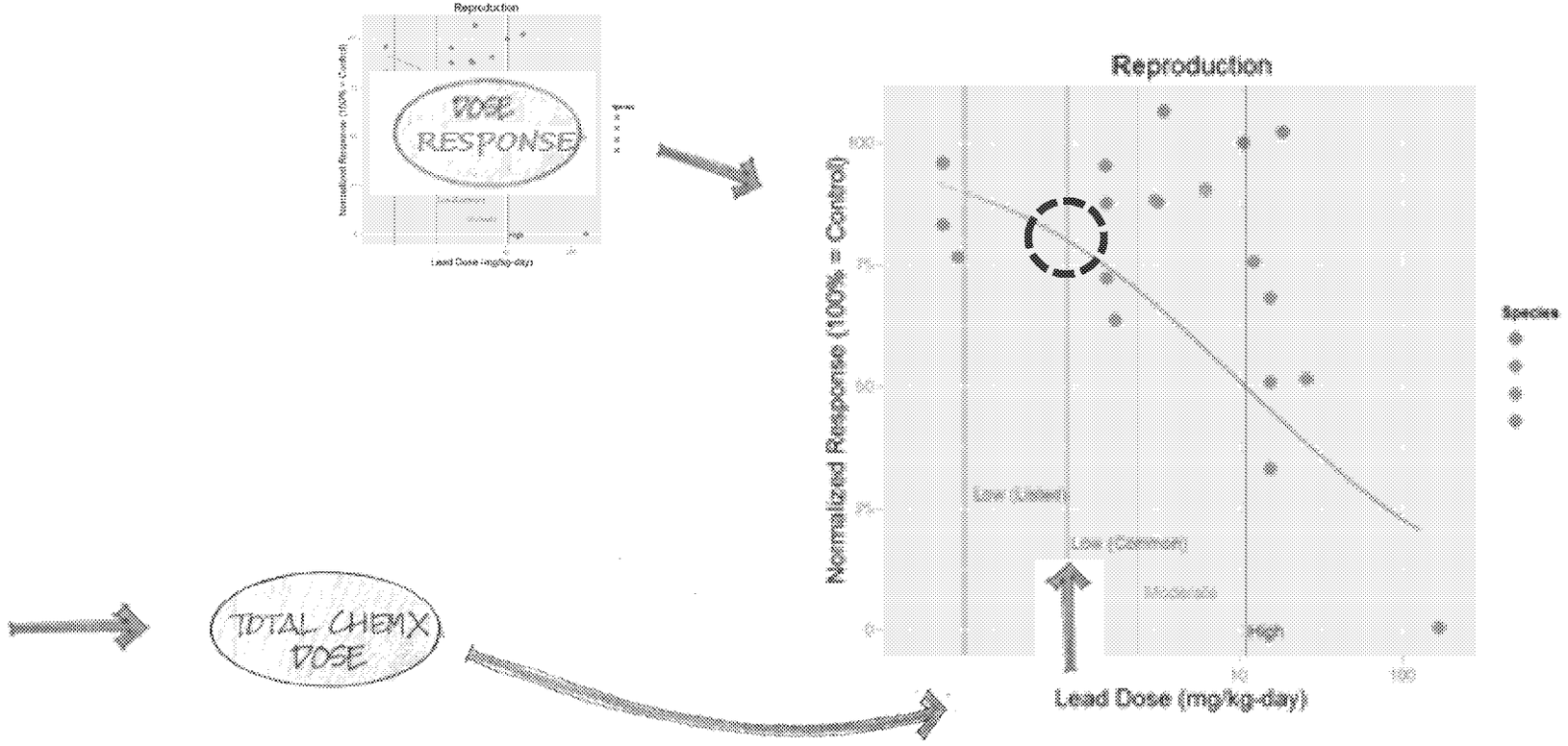
HQ<0.2	Negligible
HQ>0.2	Needs follow-up

<u>ERA</u>

HQ<1	Negligible
HQ>1	Needs follow-up

LOE Part 3b: Risk Characterization





Balance